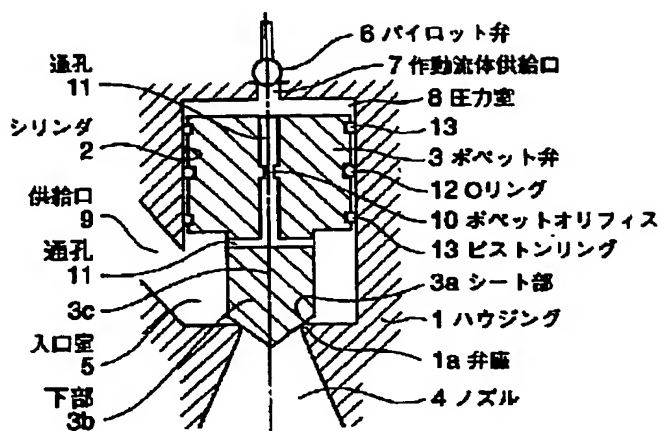


Patent Abstracts of Japan

TITLE : FLOATING-TYPE POPPET VALVE
DEVICE



SOLUTION: A floating-type poppet valve 3 is reciprocatably fitted in a cylinder 2. The poppet valve 3 is made of a heat-proof composite material of low heat conductivity such as ceramic fiber and the like, a through hole 11 bored inside of the poppet valve 3 is opened to an upper surface of the poppet valve 3, that is, a surface facing to a pressure chamber 8, downwardly extended along an axis 3c of the poppet valve 3, branched in the perpendicular direction at a lower part 3b of the poppet valve 3 and opened to an inlet chamber 5. A poppet orifice 10 formed by throttling a path is formed on the way of the through hole 11. More than two through holes 11 can be optionally formed so far as they are positioned symmetrically to the axis 3c of the poppet valve 3.

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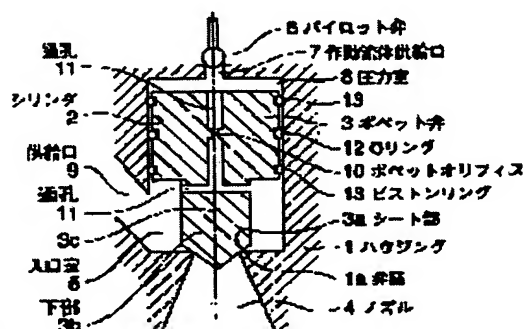
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(54) FLOATING-TYPE POPPET VALVE DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent the generation of thermal stick of a poppet valve caused by the leakage of combustion gas on a sliding part by forming the poppet valve out of a heat-proof composite material, fitting a seal ring such as a sliding O-ring and the like, communicating two chambered symmetrically with respect to a shaft center line, and boring a through hole having an orifice.

SOLUTION: A floating-type poppet valve 3 is reciprocatably fitted in a cylinder 2. The poppet valve 3 is made of a heat-proof composite material of low heat conductivity such as ceramic fiber and the like, a through hole 11 bored inside of the poppet valve 3 is opened to an upper surface of the poppet valve 3, that is, a surface facing to a pressure chamber 8, downwardly extended along an axis 3c of the poppet valve 3, branched in the perpendicular direction at a lower part 3b of the poppet valve 3 and opened to an inlet chamber 5. A poppet orifice 10 formed by throttling a path is formed on the way of the through hole 11. More than two through holes 11 can be optionally formed so far as they are positioned symmetrically to the axis 3c of the poppet valve 3.



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CLAIMS

[Claim(s)]

[Claim 1] By the differential pressure of two ** which the vertical side of the poppet valve fitting of the both-way sliding of in a cylinder was made free faces In the floating type poppet valve equipment constituted so that the tip sheet section of this poppet valve might be detached and attached to a valve seat and a gas passageway might be opened and closed Said poppet valve is floating type poppet valve equipment characterized by coming to punch the through-hole which it consists of a heat-resistant composite material, and seal rings, such as an O ring, are fitted in said sliding section, opens said two ** for free passage on the axial center line further at the symmetry, and has an orifice.

[Claim 2] Floating type poppet valve equipment according to claim 1 characterized by using the heat-resistant composite of ceramic fiber as said heat-resistant composite material.

[Claim 3] By the differential pressure of two ** which the vertical side of the poppet valve fitting of the both-way sliding of in a cylinder was made free faces In the floating type poppet valve equipment constituted so that the tip sheet section of this poppet valve might be detached and attached to a valve seat and a gas passageway might be opened and closed said two ** The pressure room in which the top face of said poppet valve faced and the feed hopper and delivery of an actuation gas were established, It consists of an inlet-port room which the inferior surface of tongue of said poppet valve faces, and is opened for free passage by the feed hopper of said gas passageway. Floating type poppet valve equipment characterized by preparing the pilot valve which connects a delivery to atmospheric air while connecting to the feed hopper of said pressure room the accumulator with which said actuation gas was enclosed, and opens and closes said feed hopper and delivery.

[Claim 4] Said pilot valve is floating type poppet valve equipment according to claim 3 with which it is constituted and the valve element of the other side becomes so that another side of said feed hopper or a delivery may be opened when it comes to fix a spherical valve element to the both ends of a valve rod and the valve element of one side has stopped either said feed hopper or the delivery.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the floating type poppet valve equipment used for the thrust control in the thruster equipment of a rocket engine etc.

[0002]

[Description of the Prior Art] In the rocket engine which uses a solid propellant, the combustion gas flow rate which passes the nozzle throat section is controlled by changing the throat area in the nozzle throat section which passes to a combustion chamber. Invention of JP,6-58090,B is offered as a technique which controls the throat area of this nozzle throat section. In this invention, said combustion chamber is equipped with the nozzle holder which has the nozzle skirt board which fixes a pintle to the back end of a combustion chamber, and forms the nozzle throat section by this pintle possible [axial directional movement], this nozzle holder is moved to shaft orientations, and it constitutes so that nozzle throat area may be changed continuously. A migration part becomes large-sized in order to move the nozzle holder which has a nozzle skirt board to shaft orientations in this invention.

[0003] Then, the floating type poppet valve equipment to which the throat area which does not have the above troubles is changed and which is shown in drawing 5 - drawing 6 as a means is proposed.

Drawing 5 - drawing 6 show the outline configuration of this floating type poppet valve equipment, and drawing 5 is drawing 6 at the valve-opening time at the time of the clausilium of a poppet valve.

[0004] In drawing 5 - drawing 6, it is the cylinder by which 1 was formed in housing and 2 was formed in this housing 1, and fitting of the both-way sliding of the poppet valve 03 of a floating type is made free into this cylinder 2. This poppet valve 03 is constituted by heat-resistant metals, such as a tungsten. 8 is the pressure room as for which partition formation was carried out by the top face and cylinder 2 of this poppet valve 03, and the working-fluid feed hopper 7 opened and closed by the pilot valve 6 is carrying out opening to this pressure room 8. This pilot valve 6 controls the pressure of said pressure room 8 by carrying out closing motion actuation with an actuator (un-illustrating).

[0005] 5 is the inlet-port room of the combustion gas formed in said housing 1, and the periphery of lower 03b of said poppet valve 03 has faced it. 9 is the feed hopper of the combustion gas to this inlet-port room 5, and is connected to the combustion chamber (un-illustrating). 4 is a nozzle for gushing combustion gas. Conic sheet section 03a is formed at the head of the soffit section 03b, and said poppet valve 03 opens and closes between said inlet-port rooms 5 and nozzles 4 by detaching and attaching with valve seat 1a prepared in housing 1.

[0006] Moreover, the through-hole 011 which opens said pressure room 8 and inlet-port room 5 of combustion gas for free passage to the part of the periphery approach to said poppet valve 03 is punched, and while being this through-hole 011, the poppet orifice 010 to which the path was extracted is formed.

[0007] The combustion gas generated in the combustion chamber (un-illustrating) at the time of actuation of this floating type poppet valve equipment is introduced into the inlet-port room 5 from a

feed hopper 9. As shown in drawing 5 , on the other hand at the time of close [of a poppet valve 03], with a pilot valve control unit (un-illustrating) A pilot valve 6 is closed and the pressure of the working fluid in the pressure room 8 serves as high voltage. The downward force by the pressure of this working fluid becomes larger than the upward force by the combustion gas pressure in the inlet-port room 5, and sheet section 03a of a poppet valve 03 is forced on valve seat 1a of housing 1, and is intercepting runoff for the nozzle 4 of combustion gas.

[0008] If a pilot valve 6 is opened by said pilot valve control unit as shown in drawing 6 , the working fluid in the pressure room 8 is discharged, the upward force by the combustion gas in the inlet-port room 5 becomes larger than the downward force by said working fluid, it will upper-**, said sheet section 03a will separate from valve seat 1a, and a poppet 03 will open a poppet valve. A thrust is generated when combustion gas flows from the inlet-port room 5 to a nozzle 4 by valve opening of this poppet valve 03 as shown in the arrow head of drawing 6 , and spouted outside.

[0009] On the other hand, a part of combustion gas in the inlet-port room 5 goes into a through-hole 011, and after it is extracted by the poppet orifice 010 and flows into the pressure room 8 side, it is discharged outside through a pilot valve 6. By changing whenever [drawing / of this poppet orifice 010], i.e., path area, the valve-opening rate and clausilium rate of a poppet 03 are adjusted.

[0010]

[Problem(s) to be Solved by the Invention] If it is in the floating type poppet valve equipment concerning the conventional technique shown in drawing 5 - drawing 6 , since a poppet valve 03 is heated by 2000 degrees C or more with the combustion gas introduced into the inlet-port room 5 from a feed hopper 9, it consists of heat-resistant metals, such as tungsten material. This tungsten material has large thermal conductivity, and the poppet valve 03 whole serves as an elevated temperature. for this reason, a clearance since the activity of the O ring made of rubber becomes impossible at the sliding section of the peripheral face of this poppet valve 03, and a cylinder 2 and the sliding section of the peripheral face of said poppet valve 03 and a cylinder 2 turns into the metallic contact section which does not have seal members, such as an O ring, -- large -- not forming -- it does not obtain, but combustion gas flows this clearance, and generating of the heat stick of a poppet valve 03 is seen in many cases.

[0011] Moreover, for said tungsten material, specific gravity is 19 g/cm³. Extent and since it is large, the responsibility of this poppet valve 03 becomes [the weight of a poppet valve 03] large low. Moreover, since said tungsten material has bad workability, recessing of a complicated configuration is difficult for a poppet valve 03, and the through-hole 011 which has the poppet orifice 010 for this reason is punched to the part of closing in of the periphery approach of a poppet valve 03. Therefore, since said through-hole 011 cannot be found on axial center 03c of a poppet valve 03, the flow of the combustion gas of the circumference of lower 03b of this poppet valve 03 does not turn into flow symmetrical with axial center 03c, but the fluid force T of the direction of a right angle acts on a poppet 03 at this axial center 03c, **** occurs in this poppet valve 03, and, thereby, the stick of a poppet valve 03 is caused to it by this fluid force T.

[0012] Moreover, if it is in the conventional poppet valve equipment shown in drawing 5 - drawing 6 , at the time of the actuation to the closeout from disconnection (drawing 6) of a poppet valve 03, since the pressure Pv in the pressure room 8 cannot be set up more than the pressure Ps in the inlet-port room 5, i.e., a system pressure, driving force required for the switching action of this poppet valve 03 is restricted, and big driving force is not needed.

[0013] On the other hand, if it is in said conventional technique, at the time of the actuation to the disconnection (drawing 6) from closeout (drawing 5) of a poppet valve 03, as for the pressure Pv in the pressure room 8, the relation of the following (1) type between the area Ah of said system pressure Ps and the poppet orifice 010 and the area Ab of sheet section 03a is.

$$P_v = (A_h / A_b) \times P_s \quad (1)$$

Therefore, at the time of close -> open actuation of said poppet valve 03, although the driving force of a poppet valve 03 increases, this pressure Pv cannot do the one where said pressure Pv is smaller like the aforementioned (1) formula smaller than a value.

[0014] It sets it as the 1st object to improve the responsibility at the time of closing motion while this invention controls the temperature rise of a poppet valve, enables the activity of seal members, such as an O ring, in view of the technical problem of this conventional technique at the sliding section of this poppet valve and a cylinder and prevents generating of the heat stick of the poppet valve by the leakage of the combustion gas in this sliding section.

[0015] Moreover, the 2nd object of this invention is to control generating of the fluid force of the direction of a right angle in the axial center of a poppet valve, and for a poppet valve become complicated, and prevent generating of poor actuation of the poppet valve accompanying this.

[0016] moreover, resistance of the poppet valve at the time of open actuation while the 3rd object obtains big driving force by the time of close actuation of a poppet valve -- the minimum -- carrying out -- closing motion of a poppet valve -- high responsibility -- with -- **** -- while being able to make, it in offering the poppet valve equipment whose actuation nature improved.

[0017]

[Means for Solving the Problem] In order that this invention may solve this technical problem, by the pressure differential of two ** which the vertical side of the poppet valve fitting of the both-way sliding of in a cylinder was made free as invention according to claim 1 faces In the floating type poppet valve equipment constituted so that the head sheet section of this poppet valve might be detached and attached to a valve seat and a gas passageway might be opened and closed Said poppet valve consists of a heat-resistant composite material, seal rings, such as an O ring, are fitted in said sliding section, further, said two ** are opened for free passage at the symmetry at the axial core wire, and the floating type poppet valve equipment characterized by coming to punch the through-hole which has an orifice is proposed.

[0018] And the heat-resistant composite of ceramic fiber is preferably used as said heat-resistant composite material like claim 2 publication.

[0019] Moreover, although it is suitable for the through-hole which has said orifice to prepare one place on an axial core wire of a poppet valve, they may be prepared in said axial core wire at the symmetry.

[two or more]

[0020] According to this invention, since thermal conductivity constitutes the ingredient of a poppet valve from tungsten material in the conventional technique with substantially small heat-resistant composite, the thermal conductivity from the lower part which touches directly on elevated-temperature gas to the periphery sliding section decreases, and the temperature rise of this periphery sliding section is controlled. This becomes usable [the seal ring made of a heatproof and oilproof rubber] for the periphery sliding section, the seal nature of the periphery sliding section improves, leakage of the gas from this section is avoided, and generating of the heat stick of the poppet valve by this leakage is prevented.

[0021] Moreover, since the poppet valve has prepared the through-hole with an orifice in the symmetry at the axial center, the fluid force by the gas which acts on a poppet valve balances, and an operation of an imbalanced fluid force like the conventional technique is avoided. Generating to which the valve by the applied imbalanced fluid force becomes complicated by this, and generating of poor actuation of a poppet valve caused by this can be prevented, and a poppet valve can be operated smoothly.

[0022] Furthermore, since specific gravity is constituted from the tungsten material concerning the conventional technique by far small heat-resistant composite, a poppet valve becomes lightweight and its valve-opening close responsibility improves.

[0023] Invention according to claim 3 by moreover, the pressure differential of two ** which the vertical side of the poppet valve fitting of the both-way sliding of in a cylinder was made free faces In the floating type poppet valve equipment constituted so that the head sheet section of this poppet valve might be detached and attached to a valve seat and a gas passageway might be opened and closed said two ** The pressure room in which the top face of said poppet valve faced and the feed hopper and delivery of an actuation gas were established, It consists of an inlet-port room which the underside of said poppet valve faces and is opened for free passage by the feed hopper of said gas passageway. While connecting to the feed hopper of said pressure room the accumulator with which said actuation gas was enclosed, a delivery is connected to atmospheric air, and it is in the floating type poppet valve

equipment characterized by preparing the pilot valve which opens and closes said feed hopper and delivery.

[0024] And preferably, when it comes to fix a spherical valve element to the ends of a valve rod and the valve element of one side has stopped either said feed hopper or the delivery, it is constituted and said pilot valve becomes so that the valve element of the other side may open another side of said feed hopper or a delivery.

[0025] Moreover, said actuation gas is better than the gas pressure of said inlet-port interior of a room to use the inert gas pressurized by high voltage.

[0026] According to this invention, since the pilot valve is always touching the gas of the low temperature from an accumulator, a temperature rise is controlled. While it becomes unnecessary that heat-resisting material uses it for a pilot valve by this and being able to use the ingredient of low cost, generating of a heat stick is also prevented thoroughly.

[0027] Moreover, since the pressure of the pressure interior of a room which acts at the time of the valve-opening -> clausilium of a poppet valve will apply the gas pressure in an accumulator as it is, it becomes possible [setting this pressure as high voltage], and can increase the driving force of a poppet valve. By this, the responsibility and actuation nature of a poppet valve improve.

[0028] On the other hand, at the time of clausilium -> valve opening of a poppet valve, the pressure interior of a room can be made into atmospheric pressure by making a delivery open by the pilot valve, being able to make a feed hopper as close, the upward force which disconnection of a poppet valve takes, i.e., the closing motion force, becomes large, and the responsibility and actuation nature improve.

[0029]

[Embodiment of the Invention] Hereafter, with reference to a drawing, the suitable operation gestalt of this invention is explained in detail in instantiation. However, the dimension of the component part indicated by this operation gestalt, construction material, a configuration, its relative arrangement, etc. are not the meaning that limits the range of this invention to it but only the mere examples of explanation, as long as there is no specific publication especially.

[0030] Drawing 1 - drawing 2 show the outline configuration of the floating type poppet valve equipment for rocket engines concerning the 1st operation gestalt of this invention, and, as for drawing 1, drawing 2 shows the time of valve opening at the time of the clausilium of a poppet valve.

[0031] In drawing 1 - drawing 2, it is the cylinder by which 1 was formed in housing and 2 was formed in this housing 1, and fitting of the both-way sliding of the poppet valve 3 of a floating type is made free into this cylinder 2. 8 is the pressure room as for which partition formation was carried out by the top face and cylinder 2 of this poppet valve 3, and the working-fluid feed hopper 7 opened and closed by the pilot valve 6 is carrying out opening to this pressure room 8. This pilot valve 6 controls the pressure of said pressure room 8 by carrying out closing motion actuation with an actuator (un-illustrating).

[0032] 5 is the inlet-port room of the combustion gas formed in said housing 1, and the periphery of lower 3b of said poppet valve 3 has faced it. 9 is the feed hopper of the combustion gas to this inlet-port room 5, and is connected to the combustion chamber (un-illustrating). 4 is a nozzle for gushing combustion gas. Conic sheet section 3a is formed at the head of the soffit section 3b, and said poppet valve 3 opens and closes between said inlet-port rooms 5 and nozzles 4 by detaching and attaching with valve seat 1a prepared in housing 1.

[0033] The above configuration is the same as that of the conventional technique shown in drawing 5 - drawing 6. In this invention, the ingredient and internal structure of a poppet valve are improved.

[0034] That is, a poppet valve 3 consists of heat-resistant composites, such as ceramic fiber with small thermal conductivity, in drawing 1 - drawing 2. 11 is the through-hole punched inside this poppet valve 3. Opening of this through-hole 11 is carried out to the field facing, the top face 8, i.e., said pressure room, of a poppet valve 3, and it is caudad prolonged along with axial center 3c of a poppet valve 3 from this top face, branches in the direction of a right angle in lower 3b of this poppet valve 3 (11a), and is carrying out opening to said inlet-port room 5. And the poppet orifice 10 to which the path was extracted in the middle of this through-hole 11 like the conventional technique shown in drawing 5 - drawing 6 is formed. In addition, although the through-hole 11 which has the poppet orifice 10 is formed

with this operation gestalt along with one piece and axial center 3c of a poppet valve 3, as long as this through-hole 11 is a symmetric position, it may be prepared in axial center 3c of a poppet valve 3 at two or more pieces.

[0035] The piston rings 13 and 13 with which O ring 12 which consists of heat-resistant oilproof rubber material becomes a list from the good metal of thermal resistance and sliding nature of this O ring 12 up and down are fitted in the periphery sliding section of said poppet valve 3.

[0036] The combustion gas generated in the combustion chamber (un-illustrating) at the time of actuation of this floating type poppet valve equipment is introduced into the inlet-port room 5 from a feed hopper 9. As shown in drawing 1, on the other hand at the time of close [of a poppet valve 3], with a pilot valve control unit (un-illustrating) A pilot valve 6 is closed and the pressure of the working fluid in the pressure room 8 serves as high voltage. The downward force by the pressure of this working fluid becomes larger than the upward force by the combustion gas pressure in the inlet-port room 5, and sheet section 3a of a poppet valve 3 is forced on valve seat 1a of housing 1, and is intercepting runoff for the nozzle 4 of combustion gas.

[0037] If a pilot valve 6 is opened by said pilot valve control unit as shown in drawing 2, the working fluid in the pressure room 8 is discharged, the upward force by the combustion gas in the inlet-port room 5 becomes larger than the downward force by said working fluid, it will upper-**, said sheet section 3a will separate from valve seat 1a, and a poppet valve 3 will open a poppet valve. A thrust is generated when combustion gas flows from the inlet-port room 5 to a nozzle 4 by valve opening of this poppet valve 3 as shown in the arrow head of drawing 2, and spouted outside.

[0038] On the other hand, a part of combustion gas in the inlet-port room 5 goes into a through-hole 11, and after it is extracted by the poppet orifice 10 and flows into the pressure room 8 side, it is discharged outside through a pilot valve 6. By changing whenever [drawing / of this poppet orifice 10], i.e., path area, the valve-opening rate and clausilium rate of a poppet valve 3 are adjusted.

[0039] In this operation gestalt, although lower 3b which touches combustion gas directly is heated and a poppet valve 3 serves as an elevated temperature since thermal conductivity consists of heat-resistant composites of ceramic fiber small enough compared with the conventional tungsten material, the amount of heat conduction to the sliding section with a cylinder 2 decreases, and the temperature rise of this sliding section is controlled. Though natural [cause / this / burning and] even if this uses O ring 12 which becomes this sliding section from a heatproof and oilproof rubber, even if it uses the metal seal rings 13 and 13, it has thermal resistance high enough.

[0040] Therefore, the seal nature of the periphery sliding section of a poppet valve 3 improves substantially compared with the conventional technique which is the seal of a metal side. Thereby, leakage of the combustion gas from the periphery sliding section is avoided, and generating of the heat stick of the poppet valve by this leakage is avoided.

[0041] Moreover, since this poppet valve 3 has formed the through-hole 11 with poppet orifice 10 in the symmetry at the axial center 3c, the fluid force T by the combustion gas which acts on this poppet valve 3 balances, and generating of imbalance force like the conventional technique is avoided. Generating to which the poppet valve 3 by this imbalance force becomes complicated, and generating of poor actuation of a poppet valve 3 caused by this are prevented by this, and actuation of a poppet valve 3 is attained smoothly.

[0042] Furthermore, it becomes good [this poppet valve 3], since specific gravity is small compared with the tungsten material (specific gravity = about three 19 g/cm) of the conventional technique the responsibility [become lightweight and] at the time of closing motion.

[0043] Drawing 3 - drawing 4 show the outline configuration of the floating type poppet valve equipment for rocket engines concerning the 2nd operation gestalt of this invention, and, as for drawing 3, drawing 4 shows the time of valve opening of a poppet valve at the time of the clausilium of a poppet valve.

[0044] In drawing 3 - drawing 4, the gas supply opening 23 and a delivery 24 are countered and established in the upper part of housing 1. The accumulator and this accumulator 21 with which, as for 21, inert gas, such as nitrogen gas, was held are connected to said feed hopper 23 through the supply

pipe 22.

[0045] 25 is a pilot valve. Globular form supply valve element 25a and discharge valve object 25b are prepared in the ends of valve rod 25c, and this pilot valve 25 opens and closes said feed hopper 23 and delivery 24 by reciprocating valve supporter 1b of said housing 1. The driving link where 26 is connected with a valve actuation actuator (un-illustrating), and 27 are actuation levers. It is supported by said housing 1 with the supporting point 28, an end side is connected with said driving link 26, an other end side is connected with valve rod 25c of said pilot valve 25, and this actuation lever 27 transmits the pilot valve driving force given to a driving link 26 to a pilot valve 25. Moreover, with this operation gestalt, the through-hole 11 and the poppet orifice 10 in said 1st operation gestalt are abolished.

[0046] Other configurations are the same as that of the 1st operation gestalt shown in drawing 1 - drawing 2, and show the same member as this with the same sign.

[0047] In this 2nd operation gestalt, the combustion gas generated in the combustion chamber (un-illustrating) is introduced into the inlet-port room 5 from a feed hopper 9, and the pressure P_s of this inlet-port room 5 is held at the combustion gas pressure. On the other hand, at the time of close [of a poppet valve 3], as shown in drawing 3, while it is made to **** a pilot valve 25 through a driving link 26 and the actuation lever 27 from a valve driving gear (un-illustrating) and supply valve element 25a opens a feed hopper 23, discharge valve object 25b closes a delivery 24.

[0048] Thereby, the inert gas in an accumulator 21 is introduced in the pressure room 8 through a supply pipe 22 and a feed hopper 23, and the pressure in this pressure room 8 serves as a pressure of an accumulator 21, and P_v of this level. And the downward force by the pressure P_v in this pressure room 8 will overcome the upward force by the pressure P_s of said inlet-port room 5, the sheet section 3a is forced on valve seat 1a, and clausilium of the poppet valve 3 is carried out.

[0049] Moreover, at the time of open [of said poppet valve 3], as shown in drawing 4, while it is made to **** said pilot valve 25 and supply valve element 25a closes a feed hopper 23, discharge valve object 25b opens a delivery 24. By this, the inert gas in the pressure room 8 is discharged outside from a delivery 24, and the pressure in this pressure room 8 serves as atmospheric pressure. The upward force by the pressure P_s of the combustion gas in the inlet-port room 5 becomes larger than the downward force by the pressure P_v in said pressure room 8, and a poppet valve 3 is upper-**(ed), sheet section 3a separates from valve seat 1a, and opens, and the combustion gas in the inlet-port room 5 flows into a nozzle 4, and generates a thrust.

[0050] Since according to this operation gestalt the inert gas of the low temperature held in the accumulator 21 is supplied to the pressure room 8 through a feed hopper 23 and it discharges outside through a delivery 24, the temperature rise of the pilot valve 25 which opens and closes this feed hopper 23 and a delivery 24 is controlled. The ingredient of low cost can be used by this, being able to use the activity of heat-resisting material as unnecessary at a pilot valve 25, and generating of the heat stick of this pilot valve 25 can also be avoided thoroughly.

[0051] Moreover, since the pressure in said accumulator 21 can be set as high voltage, it can take this pressure greatly, the pressure P_s , i.e., the combustion gas pressure, in the inlet-port room 5, enough, and can raise conventionally the pressure P_v in the pressure room 8 said whose combustion gas pressure P_s was an upper limit to the pressure in said accumulator 21. Thereby, the driving force at the time of open -> close [of a poppet valve 3] can be increased compared with the conventional technique, and the responsibility and actuation nature of this poppet valve 3 improve.

[0052] Moreover, at the time of close -> open [of a poppet valve 3], while intercepting the supply of inert gas in the pressure room 8 from an accumulator 21 by carrying out opening of the delivery 24 by the pilot valve 25 while closing a feed hopper 23, reduced pressure becomes possible to atmospheric pressure about the pressure P_v in this pressure room 8 by discharging the gas in the pressure room 8. Consequently, it becomes large at the time of close -> open [of a poppet valve 3], upward driving force, i.e., valve-opening force, of this poppet valve 3, and responsibility and actuation nature improve.

[0053]

[Effect of the Invention] Since a poppet valve consists of heat-resistant composite with small thermal conductivity like a publication above according to this invention, the temperature rise of the periphery

sliding section of this valve can be controlled, it can become usable [a heatproof and the seal ring made of oilproof rubber], leakage of the gas in this periphery sliding section can be prevented, and generating of the heat stick of the poppet valve by this leakage can be prevented.

[0054] Moreover, since the poppet valve has prepared the through-hole with an orifice in the symmetry at the axial center, generating of the imbalance of the fluid force of gas can be avoided, and it can prevent generating to which the poppet valve caused by this becomes complicated, and can operate a poppet valve smoothly.

[0055] Furthermore, as mentioned above, since specific gravity consists of small heat-resistant composite rather than the tungsten material concerning the conventional technique, a poppet valve becomes lightweight and its valve-opening close responsibility improves. By the above, endurance is high, responsibility is good and the poppet valve equipment with which smooth actuation is made can be obtained.

[0056] Moreover, since the low-temperature gas enclosed with the actuation gas to the pressure room which carries out closing motion actuation of the poppet valve by the accumulator is used according to claim 3 thru/or invention of 4, while the activity of the ingredient of low cost is attained as an ingredient of a pilot valve, generating of a heat stick is prevented. Moreover, since making it go up to the pressure in an accumulator can make easy working pressure at the time of the clausilium of a poppet valve according to this invention, valve-opening driving force can increase and a pressure room can be made to fall to atmospheric pressure thoroughly further at the time of clausilium, the valve-opening force from the underside of a poppet valve becomes large. Thereby, responsibility is high and the poppet valve equipment whose actuation nature improved can be offered.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing the configuration of the floating type poppet valve equipment for rocket engines concerning the 1st operation gestalt of this invention, and is drawing showing the time of poppet valve close.

[Drawing 2] It is drawing showing the time of poppet valve open [in said operation gestalt].

[Drawing 3] It is the Fig. corresponding to drawing 1 showing the 2nd operation gestalt of this invention.

[Drawing 4] It is a Fig. corresponding to drawing 2 in the above-mentioned 2nd operation gestalt.

[Drawing 5] It is the Fig. corresponding to drawing 1 showing the valve-closing time of the floating type poppet valve equipment concerning the conventional technique.

[Drawing 6] It is the Fig. corresponding to drawing 2 showing the time of the valve-opening of the floating type poppet valve equipment concerning the conventional technique.

[Description of Notations]

- 1 Housing
- 1a Valve seat
- 2 Cylinder
- 3 Poppet Valve
- 3a Sheet section
- 3b Lower part
- 4 Nozzle
- 5 Inlet-Port Room
- 6 Pilot Valve
- 7 Working-Fluid Feed Hopper
- 8 Pressure Room
- 9 Feed Hopper
- 10 Poppet Orifice
- 11 Through-hole
- 12 O Ring
- 13 Piston Ring
- 21 Accumulator
- 22 Supply Pipe
- 23 Feed Hopper
- 24 Delivery
- 25 Pilot Valve
- 26 Drive Ring
- 27 Drive Lever

[Translation done.]

* NOTICES *

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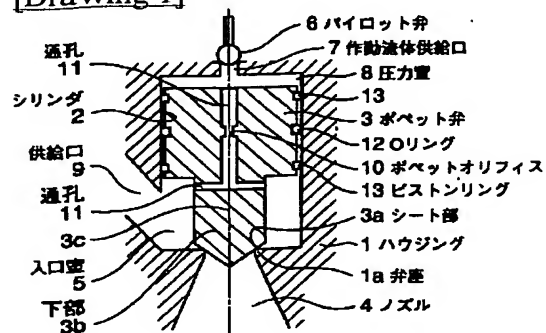
1. This document has been translated by computer. So the translation may not reflect the original precisely.

2. **** shows the word which can not be translated.

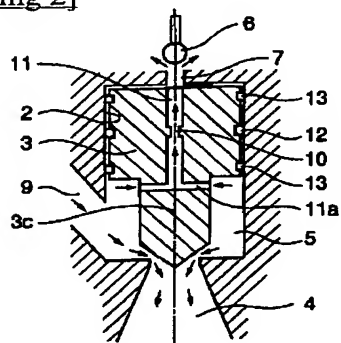
3. In the drawings, any words are not translated.

DRAWINGS

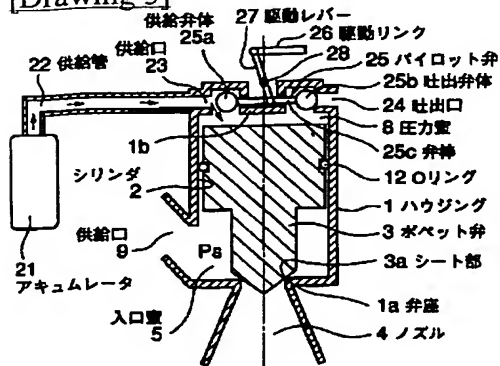
[Drawing 1]



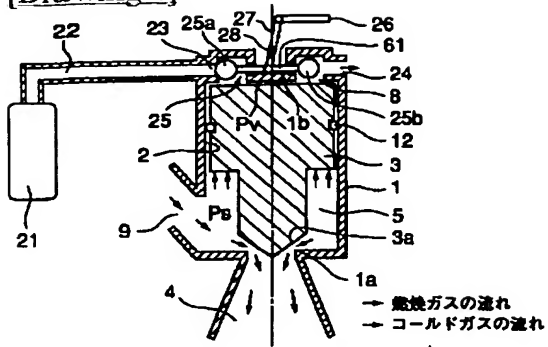
[Drawing 2]



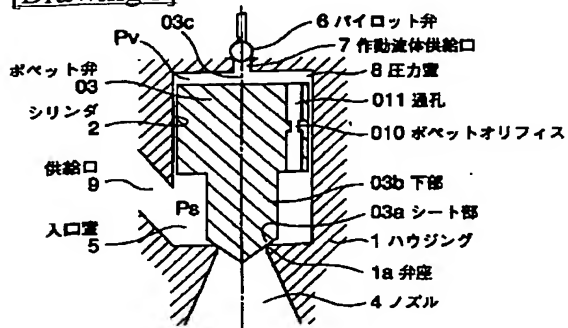
[Drawing 3]



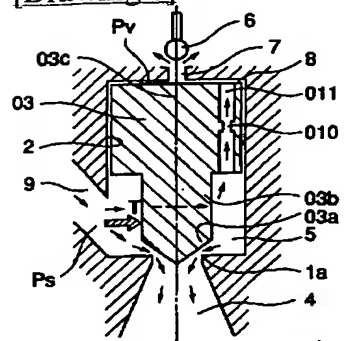
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]